

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 28

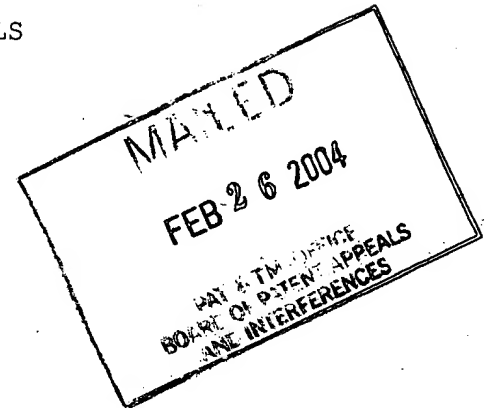
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TRUNG T. DOAN

Appeal No. 2004-0626
Application No. 09/506,204

ON BRIEF



Before GARRIS, TIMM, and JEFFREY T. SMITH, Administrative Patent Judges.

GARRIS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the final rejection of claims 1-44 which are all of the claims in the application.

The subject matter on appeal relates to a semiconductor device structure having a void-free, homogeneous aluminum alloy material within contact holes in an insulating layer, in direct contact with a substrate and having a nondeformed aluminum bridge over the contact holes. This appealed subject matter is adequately represented by independent claim 1 which reads as follows:

1. A semiconductor device structure having a void-free, homogeneous aluminum alloy material within contact holes in an insulating layer, in direct contact with a substrate and having a nondeformed aluminum bridge over the contact holes, the semiconductor device structure formed by the method comprising:

depositing an aluminum material on an exposed surface of the insulating layer and over the contact holes;

heating the aluminum material to reflow the aluminum material into the contact holes so as to at least partially fill the contact holes;

applying pressure to the aluminum material to completely fill the contact holes;

depositing a different metal material on the aluminum material over the contact holes;

and

diffusing the different metal material into the aluminum material to form a homogeneous aluminum alloy fill material in the contact holes and a nondeformed aluminum bridge over the contact holes.

The references set forth below are relied upon by the examiner as evidence of obviousness:

Kobayashi et al. (Kobayashi)	4,941,032	Jul. 10, 1990
Saran et al. (Saran)	5,998,296	Dec. 7, 1999

All of the appealed claims stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Saran taken with Kobayashi.¹

¹On page 4 of the brief, the appellant states that "claims 1-44 stand or fall together." Accordingly, in assessing the

We refer to the brief and reply brief and to the answer for a complete exposition of the opposing viewpoints expressed by the appellant and by the examiner concerning this rejection.

OPINION

We will sustain the examiner's Section 103 rejection.

We agree with the examiner that it would have been obvious for one with an ordinary level of skill in the art to utilize as Saran's fill metal an aluminum alloy of the type and for the reasons taught by Kobayashi. We perceive no merit in the appellant's argument that an artisan would not have been motivated to so combine the teachings of Saran and Kobayashi. This combination plainly would have been motivated by a desire to obtain the benefits expressly taught by Kobayashi (e.g., see the abstract). In any event, this obviousness issue does not appear to be relevant to the patentability of representative independent claim 1 since the aluminum alloy requirement of this claim is expressly taught by Saran (e.g., see lines 40-41 in column 2 and line 18 in column 3), and the appellant does not argue otherwise.

merits of the above noted rejection, we will focus on representative independent claim 1 with which the other appealed claims will stand or fall. See 37 CFR § 1.192(c)(7)(2002).

As for the appellant's argument that the "void-free" limitation of claim 1 distinguishes over Saran, we fully share the examiner's view that the Saran patent as a whole teaches or at least would have suggested a semiconductor device structure having a void-free aluminum alloy material 30, 60 within contact holes or openings 20, 50 (see figure 1A in comparison with figure 1B and figure 2A in comparison with figure 2B as well as the specification disclosures relating to these figures). We recognize the appellant's point that Saran uses the term "substantially" in stating that his fill metal "substantially fills the void" (see line 4 and lines 38-39 in column 3). As correctly noted by the examiner, however, it is apparent from the express teaching at lines 48-50 in column 1 that patentee's objective is to "completely fill the contacts and vias" (column 1, line 49). Moreover, consistent with this expressed objective, Saran unambiguously shows the openings 20 and 50 in figures 1B and 2B respectively as being completely filled. Under these circumstances, it is apparent that use of the term "substantially" in column 3 was not intended by patentee, and would not be interpreted by an artisan with ordinary skill, as describing the presence of a void in his filled opening.

We also share the examiner's view that Saran discloses an aluminum bridge which must be considered nondeformed, as required by the claim under review. This is because, as explained by the examiner, no bridge deformation is shown in patentee's drawing or disclosed in patentee's specification. We discern no support for the appellant's argument that the process of Saran would have resulted in a bridge deformation of the type shown in figure 2 of the appellant's drawing. There is simply nothing in the subject specification or drawing which indicates that figure 2 depicts a structure resulting from Saran's process.

Finally, we also find no persuasive merit in the appellant's argument that Saran contains no teaching or suggestion of direct contact between the aluminum alloy in his openings and the substrate therebelow as required by appealed claim 1. While patentee shows the presence of barrier/adhesion layers between his aluminum alloy fill metal and the underlying substrate, patentee explicitly teaches that these layers "may be formed" (line 29 of column 2 and line 11 of column 3; emphasis added). Like the examiner, we conclude that such a teaching would have led the artisan to consider these layers as discretionary and accordingly to omit them, for example, in order to save costs. See In re Edge, 359 F.2d 896, 899, 149 USPQ 556, 557 (CCPA 1966).

Also see In re Thompson, 545 F.2d 1290, 1294, 192 USPQ 275, 277 (CCPA 1976). The resulting structure would possess the "direct contact" feature under review. Contrary to the appellant's apparent belief, an obviousness conclusion is not improper simply because "Saran does not include a single embodiment lacking the barrier layer" (brief, page 9). This is because an applied reference may be relied upon to establish obviousness, not only for the preferred embodiments disclosed therein, but for all that it would have reasonably suggested to one having ordinary skill in the art. Merck & Co. v. Biocraft Labs, Inc., 874 F.2d 804, 807-08, 10 USPQ2d 1843, 1846 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989).

For the above stated reasons, it is our ultimate determination that the reference evidence adduced by the examiner establishes a prima facie case of obviousness with respect to appealed independent claim 1 which the appellant has failed to successfully rebut with argument and/or evidence of nonobviousness. It follows that we will sustain the examiner's Section 103 rejection of all appealed claims as being unpatentable over Saran taken with Kobayashi. See In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).


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The decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED


BRADLEY R. GARRIS)
Administrative Patent Judge)


CATHERINE TIMM)
Administrative Patent Judge)


JEFFREY T. SMITH)
Administrative Patent Judge)

BOARD OF PATENT
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EDGAR R. CATAXINOS
TRASK, BRITT & ROSSA
P.O. BOX 2550
SALT LAKE CITY, UT 84110